Comparative Analysis of the LSOA II Public-Use and Restricted-Use Linked Mortality Files: 2010 Data Release

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Introduction

In 2009, NCHS completed a mortality update for the Second Longitudinal Study of Aging (LSOA II) participants, with mortality ascertained through December 31, 2006. Due to requirements to protect the confidentiality of the LSOA II participants, a restricted-use version of the LSOA II Linked Mortality File was made available only through the NCHS Research Data Center (RDC). To complement the restricted-use file and increase data access, NCHS has developed a plan to allow for a public-use release of linked mortality data.

In 2010, NCHS released a public-use version of the LSOA II Linked Mortality File. The public-use data release includes the addition of perturbed data and was developed with the intent of eliminating re-identification risk to survey participants, maximizing the amount of mortality data to be included in the public-use release, while at the same time limiting the amount of synthetic data introduced to the data file.

This report describes a comparative analysis of the public-use and restricted-use LSOA II Linked Mortality Files. We used Cox proportional hazards models to compare the relative risk estimates for a standard set of socio-demographic covariates for all-cause as well as cause-specific mortality risk. NCHS is conducting this comparative analysis to demonstrate the comparability between the two versions of linked mortality files. NCHS recommends that researchers use these new linked mortality files as they supersede all prior data releases of the LSOA II Linked Mortality File.

Description of LSOA II Linked Mortality Data Resources

Mortality status for eligible LSOA II survey participants is ascertained primarily through probabilistic record matching with the National Death Index (NDI). For a complete description on the matching methodology please refer to http://www.cdc.gov/nchs/data/datalinkage/matching_methodology_lsoa2_final.pdf.

The restricted-use file includes detailed mortality information for all eligible survey participants. The restricted-use file includes the following variables: survey respondent eligibility status, mortality status, age at death, age last known alive, date of death (month, day and year), underlying and multiple causes of death, date of birth, and interview date (month and year).

Due to confidentiality protections, the public-use file includes only a limited set of mortality variables and was subjected to data perturbation techniques to reduce the risk of participant re-identification. Synthetic data were substituted for the actual date of death and underlying cause-of-death data for selected decedent records[1]. Information regarding vital status was not perturbed. Variables provided on the public-use LSOA II Linked Mortality File include: survey respondent eligibility status, mortality status, date of death (quarter and year), and 113 grouped recodes of underlying causes of death. In addition, three variables were created to indicate the presence of diabetes, hypertension, or hip fracture in the multiple causes of death codes, when these conditions are reported as contributing, rather than underlying, causes of death.

Methods

Sample selection

To effectively compare the restricted-use and public-use data sets, we merged the public-use LSOA II baseline data file (The Second Supplement on Aging, 1994) with the accompanying public-use and restricted-use mortality files, respectively, to create the analytic samples. We restricted all analyses to those eligible for mortality follow-up, who

[1] The LSOA II Linked Mortality data perturbation plan is consistent with the perturbation rules implemented for the public-use National Health Interview Survey (NHIS) Linked Mortality Files, since the LSOA II cohort is drawn from the 1994 NHIS.

were non-Hispanic white, non-Hispanic black, or Hispanic, and with no missing values for education level, marital status, region, date of death and cause of death. The final sample for the comparative analyses included 8,862 records for all-cause mortality and 7,586 records for cause-specific mortality. The analysis of cause-specific mortality is restricted to non-Hispanic whites only due to the small numbers of non-Hispanic blacks and Hispanics in the LSOA II.

Outcome measurement

We examined all-cause and cause-specific mortality in the public-use and restricted-use LSOA II Linked Mortality Files using time from the LSOA II interview until death; respondents who were not identified as deceased by the end of the follow-up period were assumed to be alive. For the public-use file, duration of follow-up was constructed using interview year and year of death. Respondents who died in the same year as their interview were assumed to have ½-year of follow-up time as their duration. All other decedents were assumed to have ½–year of follow-up during the year of their interview, a full year of follow-up for each year after their year of interview until the year prior to their death, and then another ½-year of follow-up during the year of their death. For respondents assumed alive, their follow-up time was calculated by assuming ½-year of follow-up during their interview year and a full year of follow-up for each year thereafter until the end of 2006. For the restricted-use files, duration of follow-up was calculated using information on the month and year of the interview[2] and the month, day, and year of death or, for respondents assumed alive, until the end of the follow-up period, December 31, 2006.

In addition to all-cause mortality, we examined seven causes of death. The LSOA II Linked Mortality files encompass both the Ninth Revision of the *International Classification of Diseases* (ICD-9) and the Tenth Revision (ICD-10) cause-of-death coding for all U.S. deaths. In order to have the same cause-of-death codes across all years in the study period, we used the ICD-10 underlying cause-of-death 113 group recode,

[2] Interview day was set to the 15th of the month for all records. For a small number of decedents who died in the same month of their interview, this resulted in a date of death prior to interview data. These records were dropped from the analytic sample.

which recodes all deaths occurring prior to 1999 into ICD-10 codes.[1] Although the code numbers are the same for all years of mortality data, the coding rules for determining underlying cause-of-death differ for deaths that occurred prior to 1999 under ICD-9 and those that occurred in later years under ICD-10. The analyses presented in this paper do not control for the transition in coding rules between ICD-9 and ICD-10 because that transition does not affect the comparisons of interest in this paper.

The cause-specific death categories include the following Underlying Cause-of-Death Recoded 113 Groups: heart disease (55-68), ischemic heart disease (59-61), cancer from all sites (20-44), lung cancer (27), cerebrovascular diseases (70), Alzheimer's disease (52) and pneumonia and influenza (77-78).

Covariates

We included in all models a standard set of socio-demographic characteristics, which were reported at the time of LSOA II interview: age (70-79 yrs, 80-89 yrs, 90+ yrs), sex, race/ethnicity (non-Hispanic black, non-Hispanic white, Hispanic), educational attainment (less than high school, high school diploma, more than high school), marital status (widowed, divorced/separated, never married, married), and region of the country (South, Midwest, Northeast, West).

Data Analysis

We used Cox proportional hazards models to compare the relative risk estimates for the covariates for all-cause as well as cause-specific mortality risk. All relative risk estimates were calculated with the survival procedure in Software for Survey Data Analysis (SUDAAN), version 10.0 to take into account the complex survey design of the LSOA II.[2] The Efron method was used for handling tied failure times.[3] The cause-specific mortality analyses are restricted to non-Hispanic whites.

Results

Descriptive Results

Table 1 shows the unweighted sample counts (n) and weighted percentage distributions for the covariates used in the analyses. Note that these descriptive statistics for covariates do not differ between the public-use and restricted-use files because the only differences between the two files are associated with the variables taken from the mortality file. Briefly, the distributions of covariates are as expected: the average age is 76.3 years, reflecting that over two-thirds of the sample is between 70-79 years. Females make up approximately 60 percent of the sample, and non-Hispanic whites make up 88.3 percent of the sample while non-Hispanic blacks (7.6 percent) and Hispanics (4.2 percent) account for considerably smaller proportions. A majority of the sample is married at the time of LSOA II interview (53.8 percent) and almost 40.0% have less than a high school education.

The total number and percentage of persons, in our sample, who were identified as dying in each of the two files (n = 5,440; percent = 61.4) is identical, since for the public-use file the vital status of individuals was not changed as a result of the perturbation process. The public-use file uses less detailed date information (year information only) and includes perturbed information for year of death for selected decedents, which affects the calculation of follow-up time. Yet, for the LSOA II, the mean years of follow-up (weighted) for both files are very similar (approximately 8.0 years). We examined the cause-specific percentage distributions for the five causes of death studied. Overall, the distributions are quite similar when comparing the two files. For example, heart disease (35%) and cancer (20%) account for the largest percentage of deaths in both files and ischemic heart disease and cerebrovascular diseases each account for approximately 8-9% (data not shown).

All-Cause Mortality Model Results

Table 2.1 displays results from two Cox proportional hazards models of all-cause mortality: one estimated from the public-use file and one estimated from the restricted-use file. Recall that while vital status was not changed between the two files, there are differences in the duration of follow-up variables due to the perturbation of date of death for selected decedents in the public-use file and different specificity of date of death

information used in the calculation. The results of both models are consistent. As expected, age is very strongly and positively related to the risk of mortality, and mortality risk is significantly higher for men compared to women. In addition, mortality risk differs by educational group and marital status. Moreover, the relative risks and 95% confidence intervals are consistent when comparing the results from the public-use and restricted-use files. The results of all-cause Cox proportional hazards models of adult mortality that are estimated separately by sex are shown in Table 2.2. The sex-specific models yield consistent results, with very similar coefficients and standard errors when the public-use and restricted-use files are compared.

Cause-Specific Mortality Model Results

Tables 3.1 through 3.7 display the results of the Cox proportional hazards models for seven specific underlying causes of death. Each cause-specific table provides a comparison of the model results from the public-use version and the restricted-use version of the LSOA II Linked Mortality Files. As previously mentioned, these cause-specific results are limited to individuals who are identified as non-Hispanic white.

A comparison of the results for the public-use and restricted-use files for each of the seven causes yields similar results. To illustrate an example of the consistency between results from the public-use data and restricted-use data, Table 3.1 provides comparative models that specify heart disease mortality as the outcome variable. Both versions of the LSOA II Linked Mortality Files, show that for non-Hispanic whites mortality risk from heart disease increases with age and mortality risk is 1.7 times greater for men than women. The results also show that over the course of the follow-up period, those with less than a high school education experience 26 percent higher heart disease mortality risk than those with more than a high school education according to the public-use data and 30 percent higher heart disease mortality risk according to the restricted-use data.

In general, the conclusions to be reached from the models are identical and there are only minor differences when comparing the actual coefficients and standards errors of the models. We did find instances where relative risk estimates were similar between the

restricted-use and public-use files, but in the public-use file, traditional levels of statistical significance ($p < 0.05$) were not met for some of the levels of the variables. This was the case for the association of education on heart disease mortality risk and the association of marital status on cancer mortality risk.

Discussion

This report describes analyses comparing results obtained from the public-use version and restricted-use version of the LSOA II Linked Mortality Files, with mortality follow-up through 2006. In the public-use version of the data file, a limited amount of information for decedents was perturbed. Further, there is less detailed date of death information in the public-use version, compared to the restricted-use file, where no information has been perturbed and there is complete information on date of death.

The comparative analysis finds that the two data files yield very similar descriptive and model results. This is particularly true when examining all-cause mortality. Because the perturbation process in the public-use files did not affect the vital status of any individuals in the file, differences in results between the two files when examining overall (all-cause) mortality arise because the public-use files include perturbed information for date of death as well as less specific information regarding date of death for individuals compared to the restricted-use files. In the end, the differences that resulted from the comparisons of all-cause mortality between the public-use files and restricted-use files were very minor.

The comparative analysis of cause-specific mortality across the public-use and restricted-use versions of the LSOA II Linked Mortality Files also yielded consistent model results. Moreover, for non-Hispanic whites, no differences in conclusions could be reached based on these cause-specific models when comparing the public-use and restricted-use data sets. The perturbation process in the public-use files will impact the frequency distributions for causes of death and should be kept in mind when conducting cause-specific analyses of the public-use files. Yet, overall, the percentage of deaths attributed to the leading causes of death for both files remained similar.

Our findings should provide analysts with the confidence to use these most recent public-use data files providing mortality follow-up for eligible LSOA II respondents. However, there are some analytic considerations that should be noted by all potential users. First, we estimated relative risks using SUDAAN 10.0 because it accounts for complex survey designs. Moreover, caution in using the public-use file is urged when examining the mortality patterns of small subgroups of the population, such as numerically small racial/ethnic minority groups or very old individuals. This is particularly the case when cause-specific analyses of such numerically small demographic subgroups are performed.

In sum, the 2010 release of a public-use version of the LSOA II Linked Mortality File provides the public health, social science, demographic, and medical communities with a data set that is easily available, large, nationally representative, and rich in detail for both mortality covariates and specificity in outcomes. The public-use file is an important resource for researchers and policymakers in further understanding mortality trends and patterns of an aged population.

References

1. Anderson RN, Minino AM, Hoyert DL, Rosenberg HM. Comparability of cause of death between ICD-9 and ICD-10: Preliminary estimates. National Center for Health Statistics. *National Vital Statistics Reports 49*. 2001;No.2.

2. SUDAAN: Software for the Statistical Analysis of Correlated Data, 10.0. RTI International.

3. Hertz-Picciotto I; Rockhill B. Validity and efficiency of approximation methods for tied survival times in Cox regression. *Biometrics.* 1997;53:1151-1156.

Table 1. Baseline sample characteristics, LSOA II: n = 8,862

	Unweighted n	Weighted percentage or mean
Age in years, mean	n/a	76.3
Age (grouped)		
70-79 yrs	6,023	68.7%
80-89 yrs	2,488	27.5
90 yrs+	351	3.8
Sex		
Male	3,525	40.3%
Female	5,337	59.8
Race/Ethnicity		
non-Hispanic white	7,586	88.3%
non-Hispanic black	936	7.6
Hispanic	340	4.2
Education level		
Less than high school	3,622	39.7%
High school/GED	3,035	34.6
More than high school	2,205	25.7
Marital status		
Married	4,723	53.8%
Widowed	3,309	36.9
Divorced/Separated	491	5.6
Never married	339	3.8
Region		
Northeast	2,014	22.6%
Midwest	2,393	26.1
South	2,880	33.0
West	1,575	18.2

Table 2.1. Relative Risks for all-cause mortality: LSOA II linked mortality file, mortality follow-up through 2006 (n =8,862)

	Public-use			Restricted-use		
	Relative Risk	Lower Bound 95% CI	Upper Bound 95% CI	Relative Risk	Lower Bound 95% CI	Upper Bound 95% CI
Age in years (70-79 yrs)						
80-89 yrs	2.259	2.130	2.396	2.273	2.143	2.410
90 yrs+	4.511	3.977	5.116	4.525	3.987	5.137
Sex (Female)						
Male	1.571	1.480	1.667	1.571	1.480	1.668
Race/ethnicity (NHW)						
NHB	1.023	0.927	1.129	1.017	0.921	1.123
Hispanic	0.834	0.698	0.996	0.832	0.697	0.994
Education (More than high school)						
Less than high school	1.284	1.200	1.373	1.290	1.206	1.381
High school	1.199	1.111	1.294	1.204	1.115	1.299
Marital status (Married)						
Widowed	1.267	1.176	1.365	1.267	1.177	1.365
Divorced/Separated	1.347	1.183	1.534	1.344	1.180	1.531
Never married	1.311	1.145	1.501	1.308	1.144	1.497
Region (Northeast)						
Midwest	0.966	0.866	1.076	0.959	0.860	1.070
South	1.050	0.954	1.157	1.047	0.950	1.154
West	1.125	1.028	1.231	1.120	1.023	1.227

Notes:
Relative Risks are estimated from a Cox proportional hazards model.
All models adjust for sample weights and the LSOA II complex survey design using the SUDAAN software program (10.0).
NHW refers to non-Hispanic white; NHB refers to non-Hispanic black.
Values in parenthesis are reference categories.

Table 2.2. Relative Risks for all-cause mortality by sex: LSOA II linked mortality files, mortality follow-up through 2006 (n =8,862)

	Men						Women					
	Public-use			Restricted-use			Public-use			Restricted-use		
	Relative Risk	Lower Bound 95% CI	Upper Bound 95% CI	Relative Risk	Lower Bound 95% CI	Upper Bound 95% CI	Relative Risk	Lower Bound 95% CI	Upper Bound 95% CI	Relative Risk	Lower Bound 95% CI	Upper Bound 95% CI
Age in years (70-79 yrs)												
80-89 yrs	2.257	2.044	2.493	2.273	2.056	2.512	2.257	2.100	2.426	2.266	2.109	2.435
90 yrs+	4.776	3.807	5.991	4.775	3.782	6.029	4.417	3.777	5.166	4.439	3.792	5.195
Race/ethnicity (NHW)												
NHB	1.019	0.856	1.213	1.015	0.852	1.209	1.014	0.910	1.130	1.007	0.903	1.123
Hispanic	0.814	0.614	1.080	0.816	0.615	1.082	0.851	0.701	1.033	0.844	0.696	1.024
Education (More than high school)												
Less than high school	1.291	1.159	1.438	1.299	1.165	1.448	1.274	1.158	1.403	1.280	1.163	1.410
High school	1.182	1.062	1.316	1.186	1.066	1.321	1.214	1.085	1.358	1.219	1.090	1.364
Marital status (Married)												
Widowed	1.158	1.026	1.307	1.155	1.023	1.305	1.327	1.219	1.444	1.330	1.223	1.447
Divorced/Separated	1.446	1.153	1.812	1.434	1.144	1.797	1.298	1.101	1.531	1.302	1.104	1.536
Never married	1.304	1.072	1.586	1.301	1.069	1.583	1.336	1.100	1.623	1.333	1.098	1.619
Region (Northeast)												
Midwest	0.984	0.854	1.134	0.980	0.850	1.130	0.952	0.834	1.086	0.942	0.826	1.075
South	1.119	0.988	1.267	1.117	0.986	1.264	0.993	0.881	1.119	0.988	0.877	1.114
West	1.152	1.026	1.293	1.148	1.022	1.290	1.100	0.977	1.239	1.095	0.971	1.234

Notes:
Relative Risks are estimated from a Cox proportional hazards model.
All models adjust for sample weights and the LSOA II complex survey design using the SUDAAN software program (10.0).
NHW refers to non-Hispanic white; NHB refers to non-Hispanic black.
Values in parenthesis are reference categories.

Table 3.1. Relative risks for heart disease mortality: LSOA II linked mortality file, mortality follow-up through 2006, non-Hispanic whites only (n=7,586)

	Public-use			Restricted-use		
	Relative Risk	Lower Bound 95% CI	Upper Bound 95% CI	Relative Risk	Lower Bound 95% CI	Upper Bound 95% CI
Age in years (70-79 yrs)						
80-89 yrs	2.655	2.373	2.970	2.730	2.438	3.057
90 yrs+	6.338	5.191	7.739	6.628	5.426	8.097
Sex (Female)						
Male	1.691	1.519	1.882	1.705	1.529	1.902
Education (More than high school)						
Less than high school	1.257	1.112	1.421	1.296	1.144	1.468
High school	1.120	0.992	1.263	1.160	1.026	1.311
Marital status (Married)						
Widowed	1.433	1.262	1.626	1.451	1.270	1.658
Divorced/Separated	1.441	1.090	1.906	1.377	1.030	1.839
Never married	1.452	1.124	1.877	1.441	1.114	1.864
Region (Northeast)						
Midwest	1.094	0.900	1.330	1.091	0.900	1.322
South	1.093	0.916	1.304	1.108	0.932	1.318
West	1.170	0.974	1.405	1.177	0.981	1.411

Notes:
Relative Risks are estimated from a Cox proportional hazards model.
All models use sample weights and take into account the LSOA II complex survey design using the SUDAAN software program (10.0).
Values in parenthesis are reference categories.

Table 3.2. Relative risks for ischemic heart disease mortality: LSOA II linked mortality file, mortality follow-up through 2006, non-Hispanic whites only (n=7,586)

	Public-use			Restricted-use		
	Relative Risk	Lower Bound 95% CI	Upper Bound 95% CI	Relative Risk	Lower Bound 95% CI	Upper Bound 95% CI
Age in years (70-79 yrs)						
80-89 yrs	1.958	1.565	2.451	2.041	1.632	2.552
90 yrs+	3.216	2.079	4.974	3.488	2.249	5.408
Sex (Female)						
Male	1.821	1.447	2.293	1.829	1.453	2.303
Education (More than high school)						
Less than high school	1.172	0.893	1.538	1.198	0.913	1.572
High school	1.127	0.876	1.450	1.148	0.894	1.474
Marital status (Married)						
Widowed	1.588	1.206	2.091	1.610	1.224	2.118
Divorced/Separated	1.452	0.895	2.357	1.395	0.851	2.287
Never married	1.774	1.021	3.085	1.799	1.034	3.129
Region (Northeast)						
Midwest	1.049	0.774	1.421	1.033	0.762	1.400
South	1.282	0.911	1.804	1.255	0.892	1.765
West	1.309	0.938	1.826	1.310	0.937	1.833

Notes:
Relative Risks are estimated from a Cox proportional hazards model.
All models use sample weights and take into account the LSOA II complex survey design using the SUDAAN software program (10.0.).
Values in parenthesis are reference categories.

Table 3.3. Relative risks for cancer mortality: LSOA II linked mortality file, mortality follow-up through 2006, non-Hispanic whites only (n=7,586)

	Public-use			Restricted-use		
	Relative Risk	Lower Bound 95% CI	Upper Bound 95% CI	Relative Risk	Lower Bound 95% CI	Upper Bound 95% CI
Age in years (70-79 yrs)						
80-89 yrs	1.431	1.216	1.684	1.500	1.273	1.767
90 yrs+	0.871	0.531	1.429	0.987	0.608	1.605
Sex (Female)						
Male	1.857	1.600	2.156	1.870	1.610	2.174
Education (More than high school)						
Less than high school	1.222	1.028	1.452	1.235	1.040	1.467
High school	1.258	1.046	1.512	1.253	1.043	1.507
Marital status (Married)						
Widowed	1.154	0.976	1.365	1.154	0.980	1.358
Divorced/Separated	1.397	0.992	1.969	1.411	1.011	1.971
Never married	1.305	0.933	1.827	1.295	0.926	1.812
Region (Northeast)						
Midwest	0.921	0.717	1.181	0.915	0.716	1.168
South	1.022	0.814	1.283	1.010	0.805	1.267
West	1.079	0.875	1.329	1.072	0.869	1.322

Notes:
Relative Risks are estimated from a Cox proportional hazards model.
All models use sample weights and take into account the LSOA II complex survey design using the SUDAAN software program (10.0.).
Values in parenthesis are reference categories.

Table 3.4. Relative risks for lung cancer mortality: LSOA II linked mortality file, mortality follow-up through 2006, non-Hispanic whites only (n=7,586)

	Public-use			Restricted-use		
	Relative Risk	Lower Bound 95% CI	Upper Bound 95% CI	Relative Risk	Lower Bound 95% CI	Upper Bound 95% CI
Age in years (70-79 yrs)						
80-89 yrs	1.073	0.733	1.569	1.121	0.766	1.641
90 yrs+	0.482	0.139	1.674	0.529	0.152	1.841
Sex (Female)						
Male	2.077	1.567	2.751	2.088	1.575	2.768
Education (More than high school)						
Less than high school	1.793	1.271	2.530	1.811	1.294	2.535
High school	1.770	1.255	2.495	1.768	1.262	2.476
Marital status (Married)						
Widowed	0.979	0.697	1.375	0.983	0.701	1.380
Divorced/Separated	2.011	1.141	3.544	1.930	1.086	3.427
Never married	1.004	0.471	2.140	1.013	0.475	2.159
Region (Northeast)						
Midwest	1.027	0.640	1.648	1.016	0.633	1.630
South	0.889	0.569	1.388	0.873	0.557	1.366
West	1.434	0.983	2.094	1.433	0.981	2.092

Notes:
Relative Risks are estimated from a Cox proportional hazards model.
All models use sample weights and take into account the LSOA II complex survey design using the SUDAAN software program (10.0.).
Values in parenthesis are reference categories.

Table 3.5. Relative risks for cerebrovascular disease mortality: LSOA II linked mortality file, mortality follow-up through 2006, non-Hispanic whites only (n=7,586)

	Public-use			Restricted-use		
	Relative Risk	Lower Bound 95% CI	Upper Bound 95% CI	Relative Risk	Lower Bound 95% CI	Upper Bound 95% CI
Age in years (70-79 yrs)						
80-89 yrs	2.716	2.117	3.485	2.840	2.215	3.641
90 yrs+	4.909	3.069	7.853	5.562	3.558	8.695
Sex (Female)						
Male	1.182	0.916	1.527	1.201	0.932	1.547
Education (More than high school)						
Less than high school	1.131	0.841	1.520	1.141	0.853	1.528
High school	1.117	0.847	1.473	1.118	0.848	1.474
Marital status (Married)						
Widowed	1.079	0.829	1.406	1.075	0.828	1.396
Divorced/Separated	1.489	0.953	2.326	1.482	0.949	2.314
Never married	1.206	0.640	2.272	1.204	0.638	2.273
Region (Northeast)						
Midwest	0.713	0.469	1.085	0.713	0.469	1.084
South	1.199	0.841	1.708	1.182	0.826	1.691
West	1.167	0.817	1.668	1.150	0.800	1.652

Notes:
Relative Risks are estimated from a Cox proportional hazards model.
All models use sample weights and take into account the LSOA II complex survey design using the SUDAAN software program (10.0.).
Values in parenthesis are reference categories.

Table 3.6. Relative risks for Alzheimer's disease mortality: LSOA II linked mortality file, mortality follow-up through 2006, non-Hispanic whites only (n=7,586)

	Public-use			Restricted-use		
	Relative Risk	Lower Bound 95% CI	Upper Bound 95% CI	Relative Risk	Lower Bound 95% CI	Upper Bound 95% CI
Age in years (70-79 yrs)						
80-89 yrs	2.284	1.561	3.343	2.420	1.653	3.542
90 yrs+	5.283	2.521	11.069	5.930	2.834	12.409
Sex (Female)						
Male	0.570	0.381	0.853	0.582	0.389	0.872
Education (More than high school)						
Less than high school	0.906	0.591	1.387	0.918	0.599	1.407
High school	1.034	0.654	1.635	1.049	0.663	1.658
Marital status (Married)						
Widowed	0.880	0.574	1.349	0.894	0.583	1.371
Divorced/Separated	1.101	0.466	2.599	1.110	0.470	2.619
Never married	0.602	0.213	1.707	0.607	0.214	1.720
Region (Northeast)						
Midwest	0.896	0.508	1.583	0.887	0.501	1.572
South	1.043	0.633	1.718	1.039	0.632	1.709
West	1.335	0.831	2.144	1.339	0.832	2.153

Notes:
Relative Risks are estimated from a Cox proportional hazards model.
All models use sample weights and take into account the LSOA II complex survey design using the SUDAAN software program (10.0.).
Values in parenthesis are reference categories.

Table 3.7. Relative risks for pneumonia/influenza mortality: LSOA II linked mortality file, mortality follow-up through 2006, non-Hispanic whites only (n=7,586)

	Public-use			Restricted-use		
	Relative Risk	Lower Bound 95% CI	Upper Bound 95% CI	Relative Risk	Lower Bound 95% CI	Upper Bound 95% CI
Age in years (70-79 yrs)						
80-89 yrs	2.967	2.082	4.229	3.055	2.148	4.345
90 yrs+	12.109	7.174	20.437	12.733	7.574	21.405
Sex (Female)						
Male	2.089	1.490	2.927	2.251	1.601	3.164
Education (More than high school)						
Less than high school	1.388	0.899	2.143	1.338	0.876	2.046
High school	1.258	0.753	2.101	1.232	0.745	2.037
Marital status (Married)						
Widowed	1.043	0.673	1.618	1.116	0.717	1.736
Divorced/Separated	0.722	0.265	1.970	0.892	0.359	2.214
Never married	0.974	0.390	2.435	1.173	0.499	2.757
Region (Northeast)						
Midwest	0.760	0.468	1.235	0.757	0.465	1.234
South	0.630	0.398	0.998	0.663	0.424	1.036
West	0.625	0.391	0.999	0.642	0.397	1.037

Notes:
Relative Risks are estimated from a Cox proportional hazards model.
All models use sample weights and take into account the LSOA II complex survey design using the SUDAAN software program (10.0.).
Values in parenthesis are reference categories.